Improving the Utility & Comparability of a Regional Monitoring Program

Chesapeake Bay River Input Monitoring

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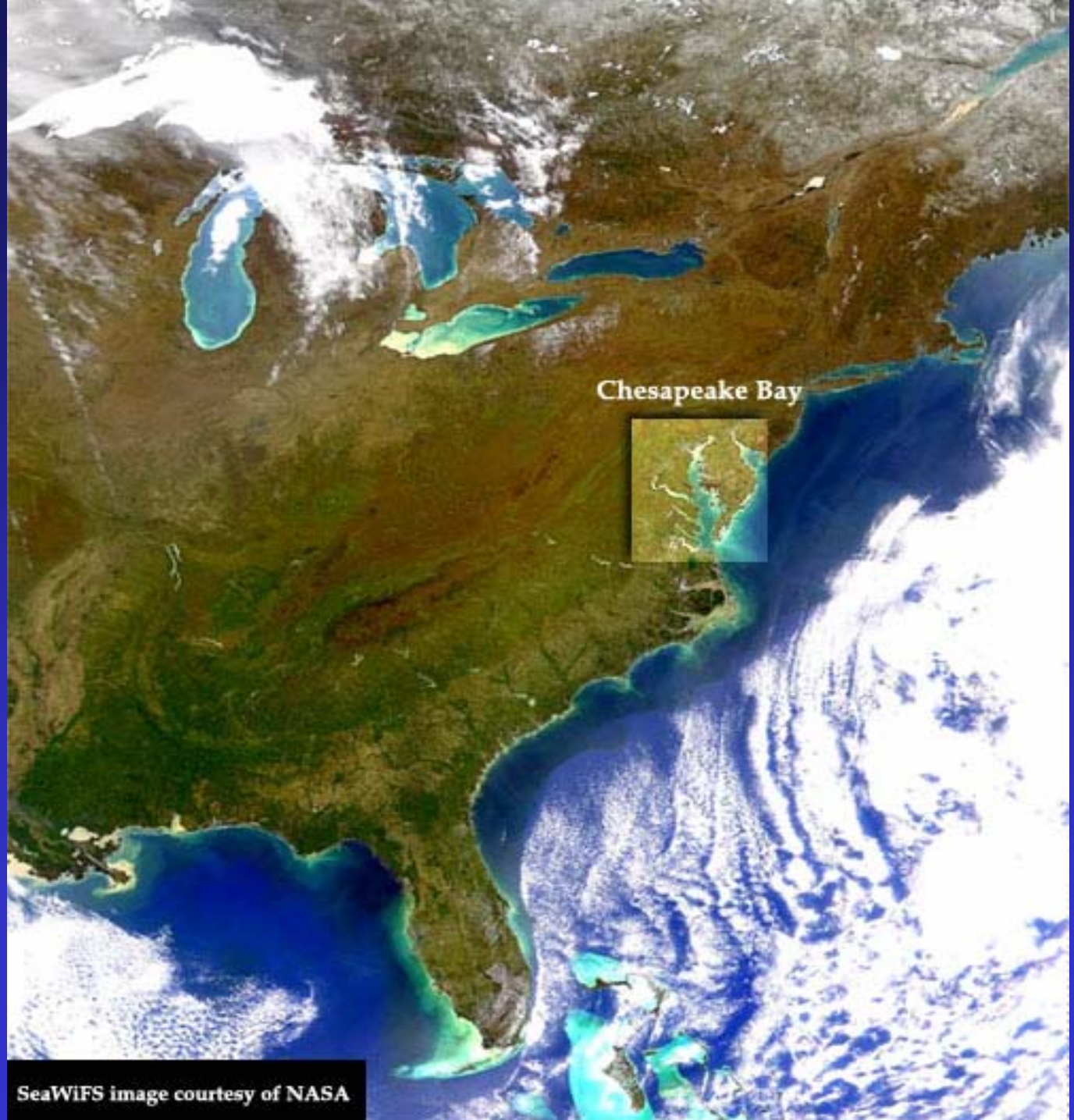
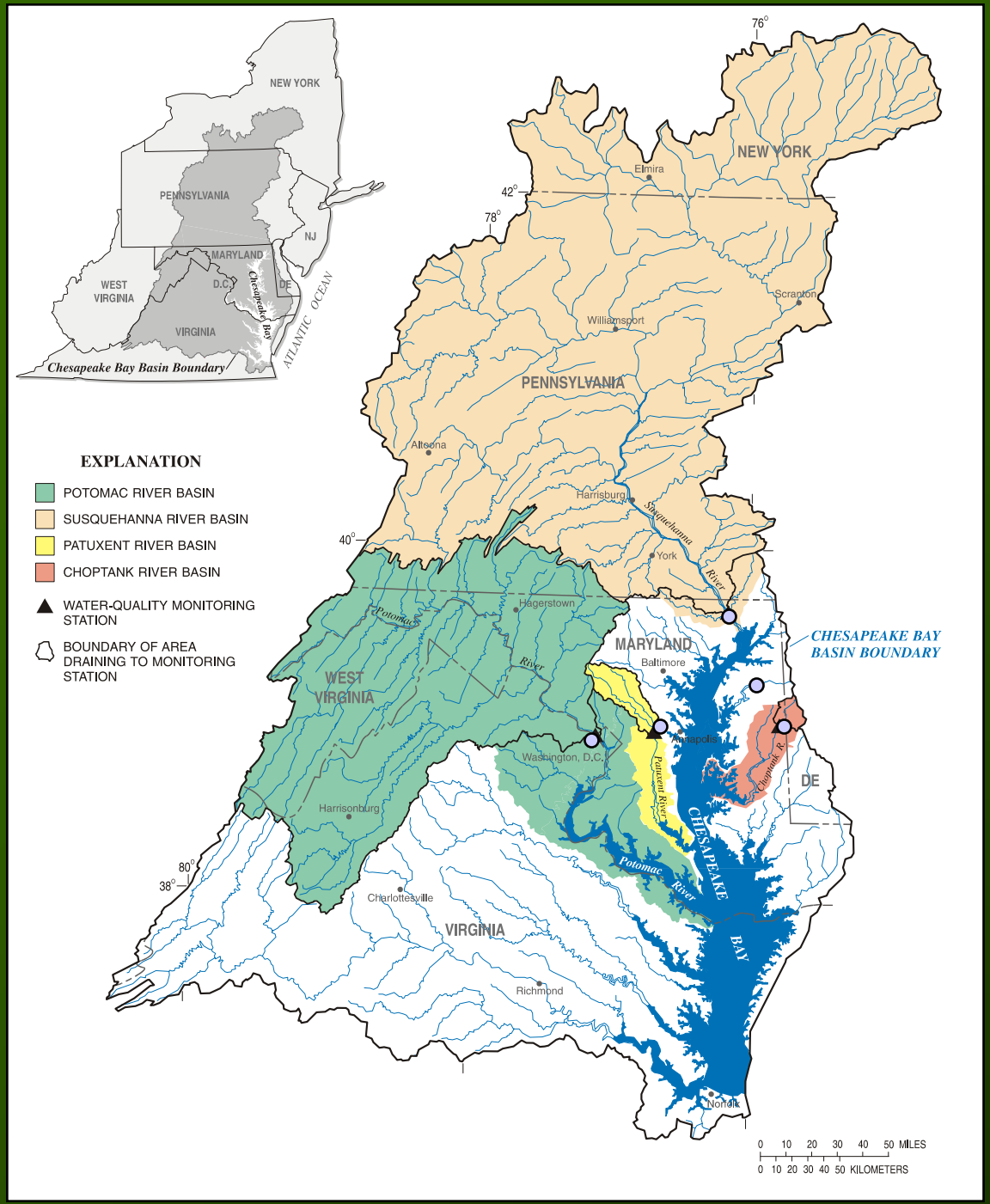
U.S. Geological Survey

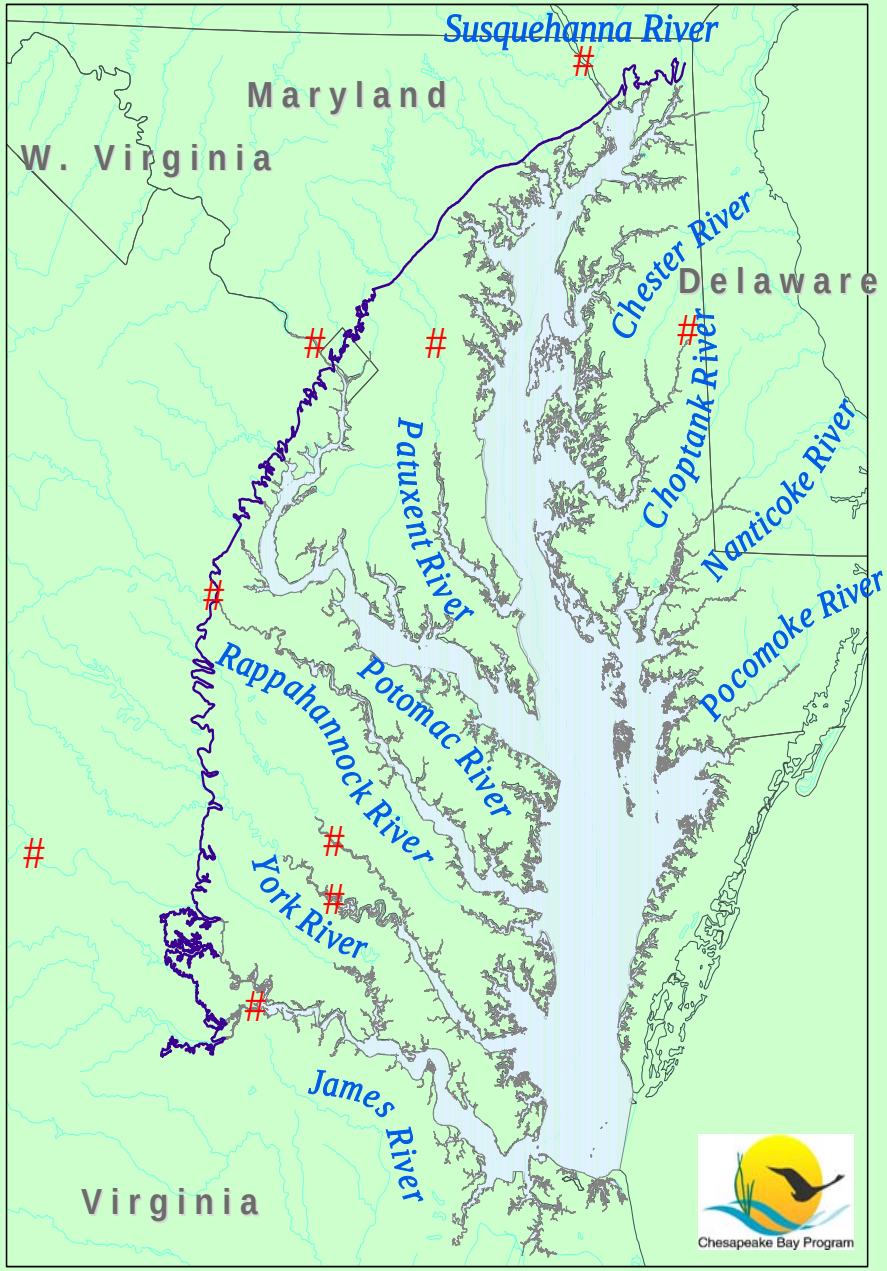

Chesapeake Bay
SeaWiFS image courtesy of NASA



CHESAPEAKE BAY

- 65,000 sq miles
- Largest estuary in US
- ~200 mi long
- 9 major basins

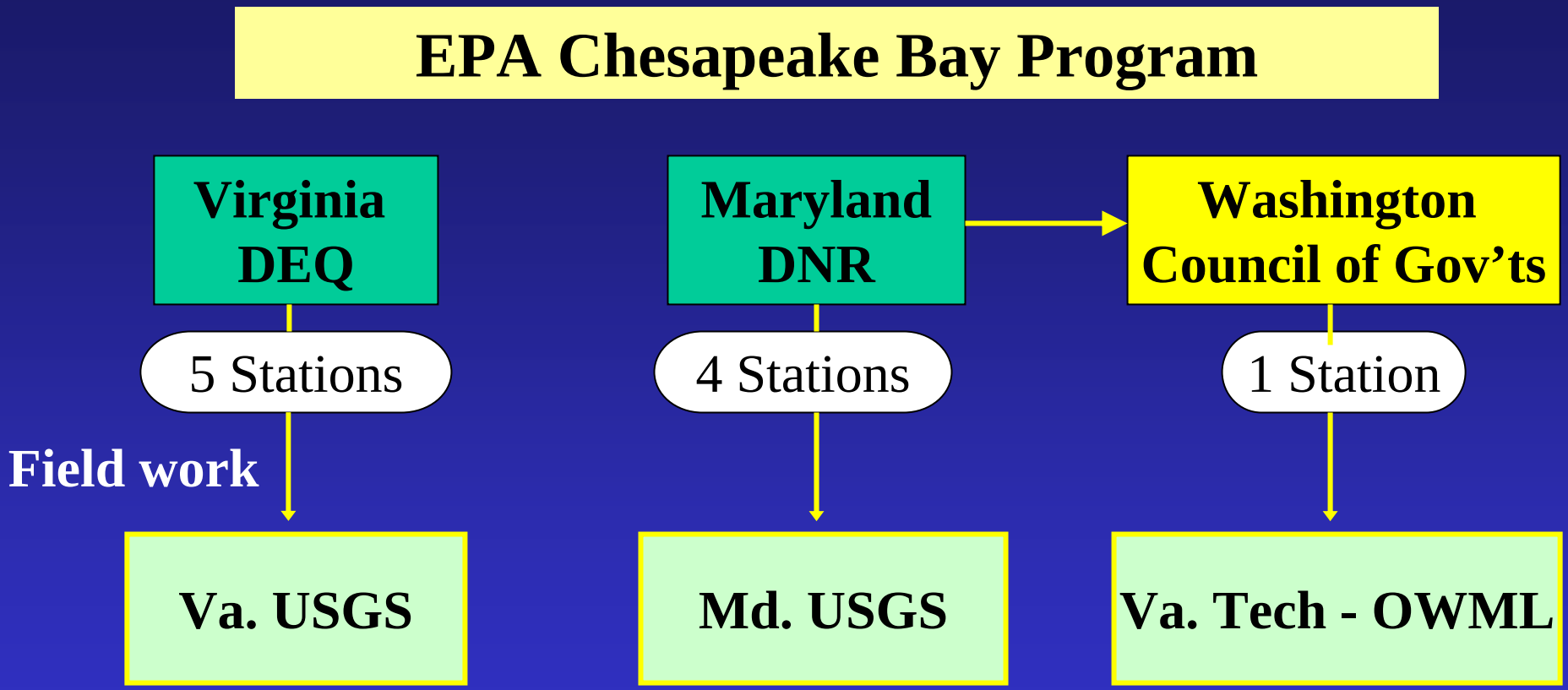
USGS


Susquehanna River
Maryland
W. Virginia
Delaware
Chester River
Choptank River
Nanticoke River
Pocomoke River
Patuxent River
Potomac River
Rappahannock River
York River
James River
Virginia
Chesapeake Bay Program

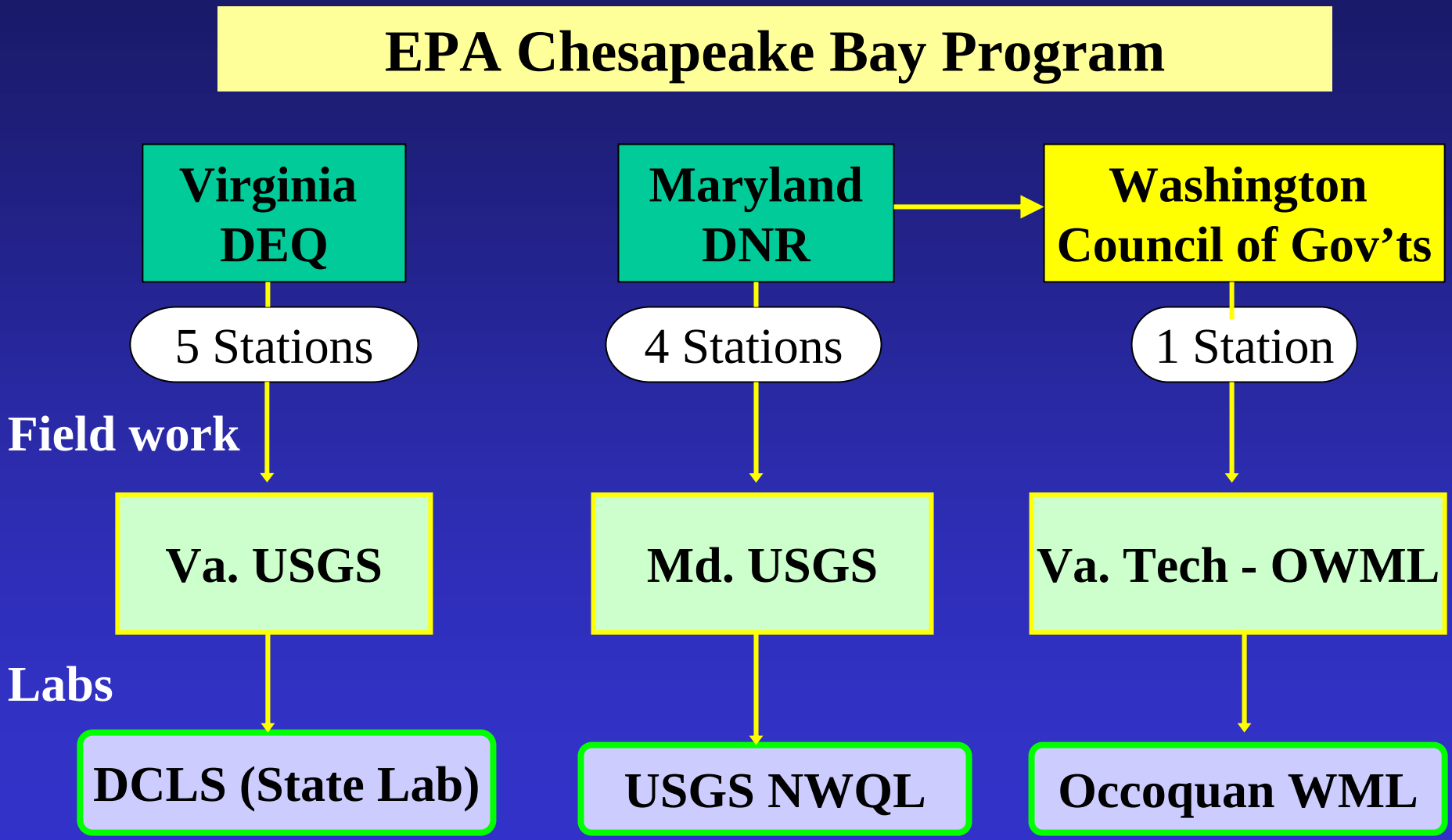
Uses of Data

- Loadings of TN, TP and sediment.
- Trends in TN, TP and sediment concentrations.
- Calibration data for watershed model.
- Input loadings to estuarine model.

Participating Organizations



Participating Organizations



Need for Change

- Different parameters and lab methods among cooperators
- Sampling procedures vary
- New parameters desired by watershed and estuarine modelers

Target Parameter List

Nitrogen	Phosphorus	Carbon	Solids
TDN	TDP	DOC	TSS
PN	PP	PC	VSS
$NO_{2/3}$	PIP	PIC	SSC
NH_4	PO_4		Chl *a*

Sampling differences

Va. USGS 5 stations	**Md. USGS** 4 stations	**Va. Tech/OWML** Potomac R.
• **EWI or EDI**	• **EWI or EDI**	• **Single point**
• **DH-95, D-96 or weighted bottle**	• **D-96 or w. bottle**	• **Auto-sampler**
• **Baseflow: 2/mo**	• **Baseflow: 1/mo**	• **Baseflow: 2-4/mo**
• **Storms: 20/yr**	• **Storms: 6/yr**	• **Storm: 25 days/yr**

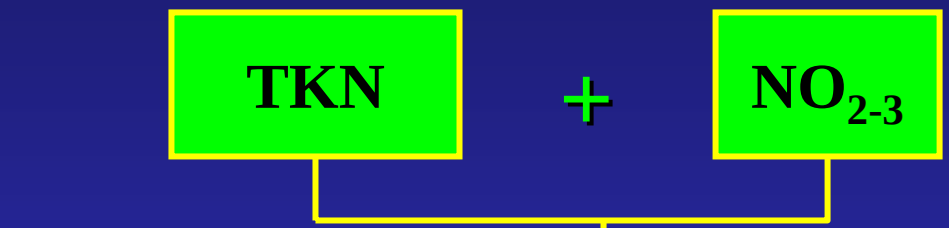
QW Collection Equipment

QW Storm Collection

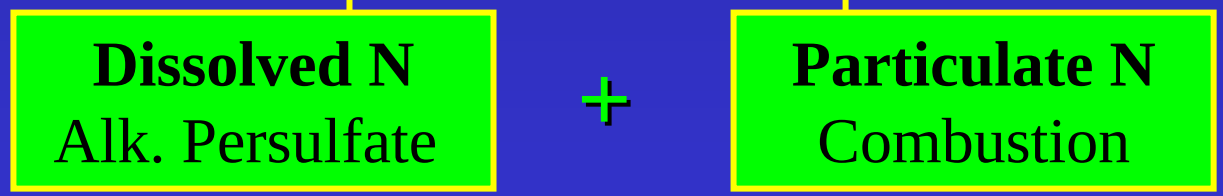

Autosampler intake
Potomac River at Chain Bridge

Analytical Differences - Nitrogen

Maryland & MWCOG

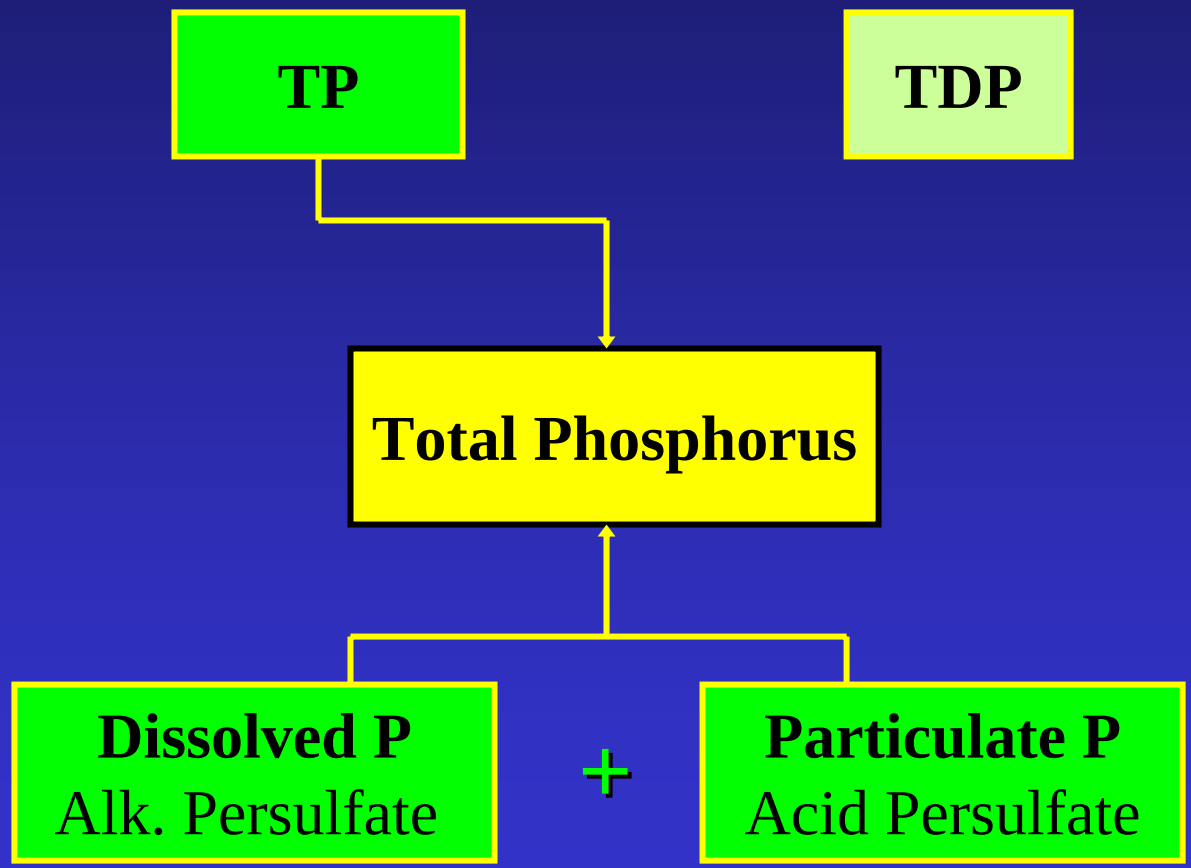


Virginia



Analytical Differences – Phosphorus

Maryland & MWCOG



Virginia

Virginia Changes in 2003

- New constituents added:
  - DOC
  - Particulate Inorganic Carbon
  - Particulate Inorganic Phosphorus
  - Chlorophyll *a*
- Sampling frequencies reduced to 1/mo.
- Net cost increase of ~ $8,000/yr.

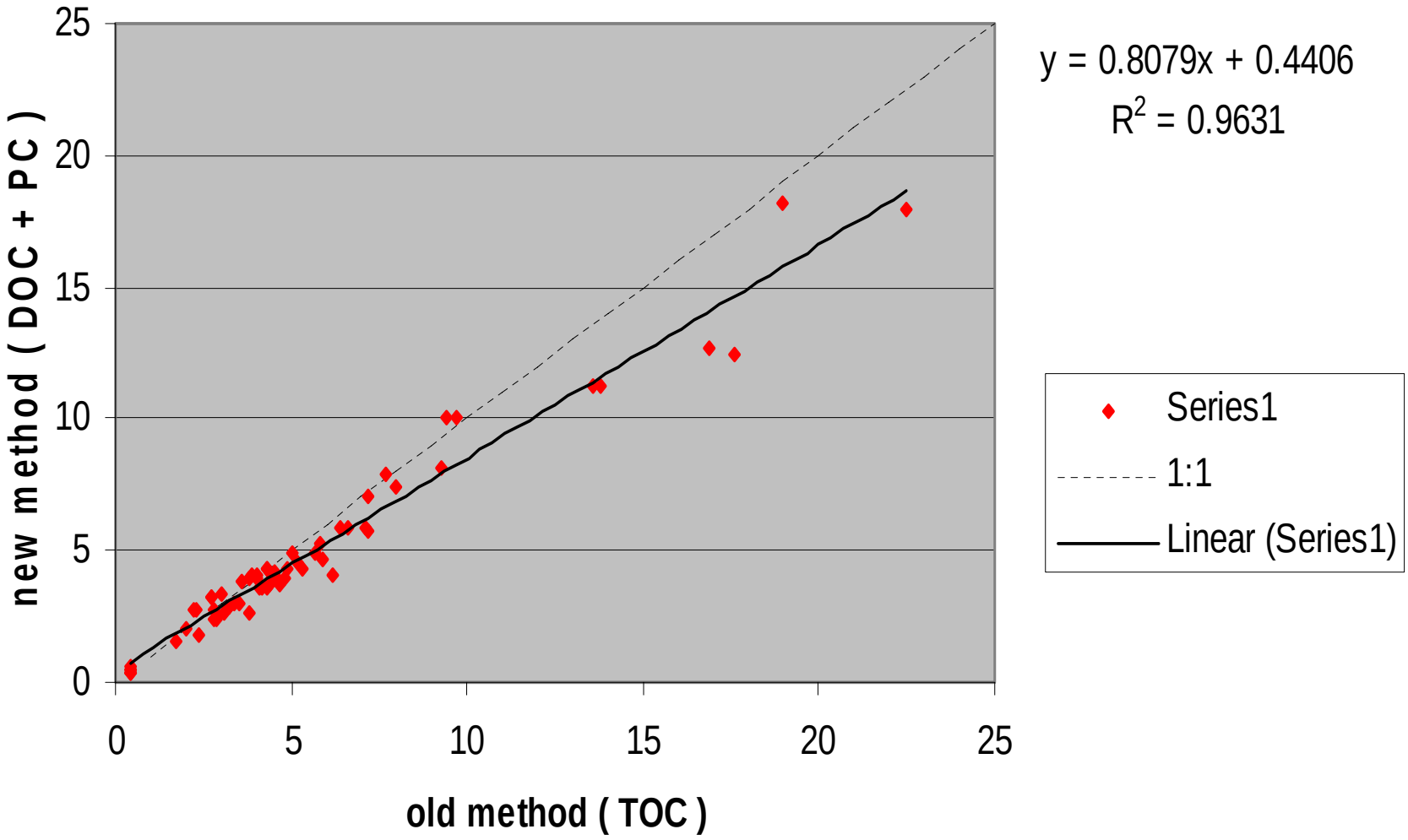
Maryland Comparability Study

1. Both USGS and OWML sampled Potomac R. to compare storm collection methods

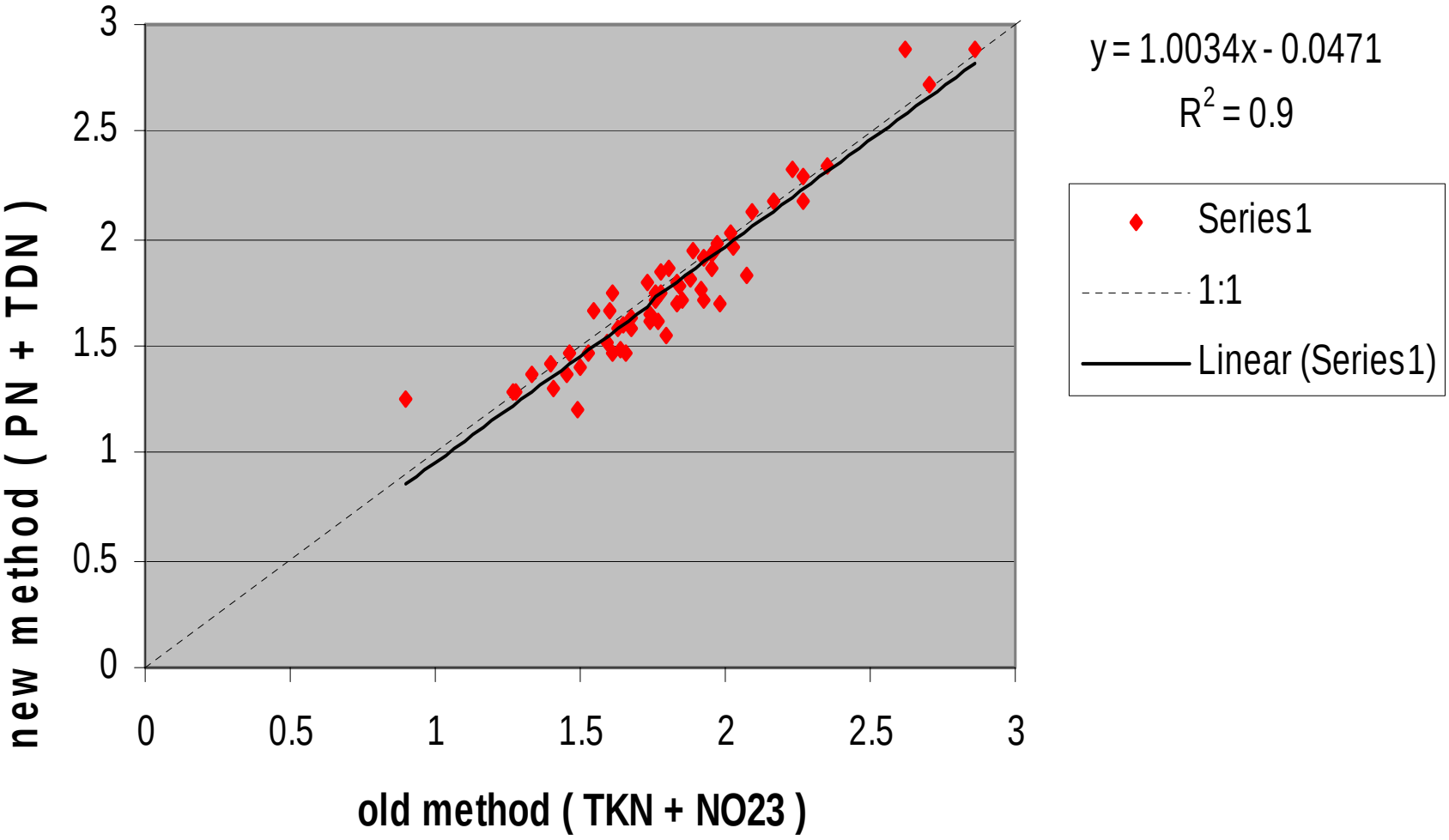
2. Lab method comparability study
   1. Kjeldahl vs. Alk.Persulfate + Particulates
   2. 60 sample pairs @ 4 stations
   3. NWQL analyzed all constituents except PP & PIP

3. Additional sampling cost in ’03 were $17-k (lab costs were
   $260 (in 2002- historically)
   $440 (in 2003- - STUDY COSTS)
   $310 (in 2004 and beyond)

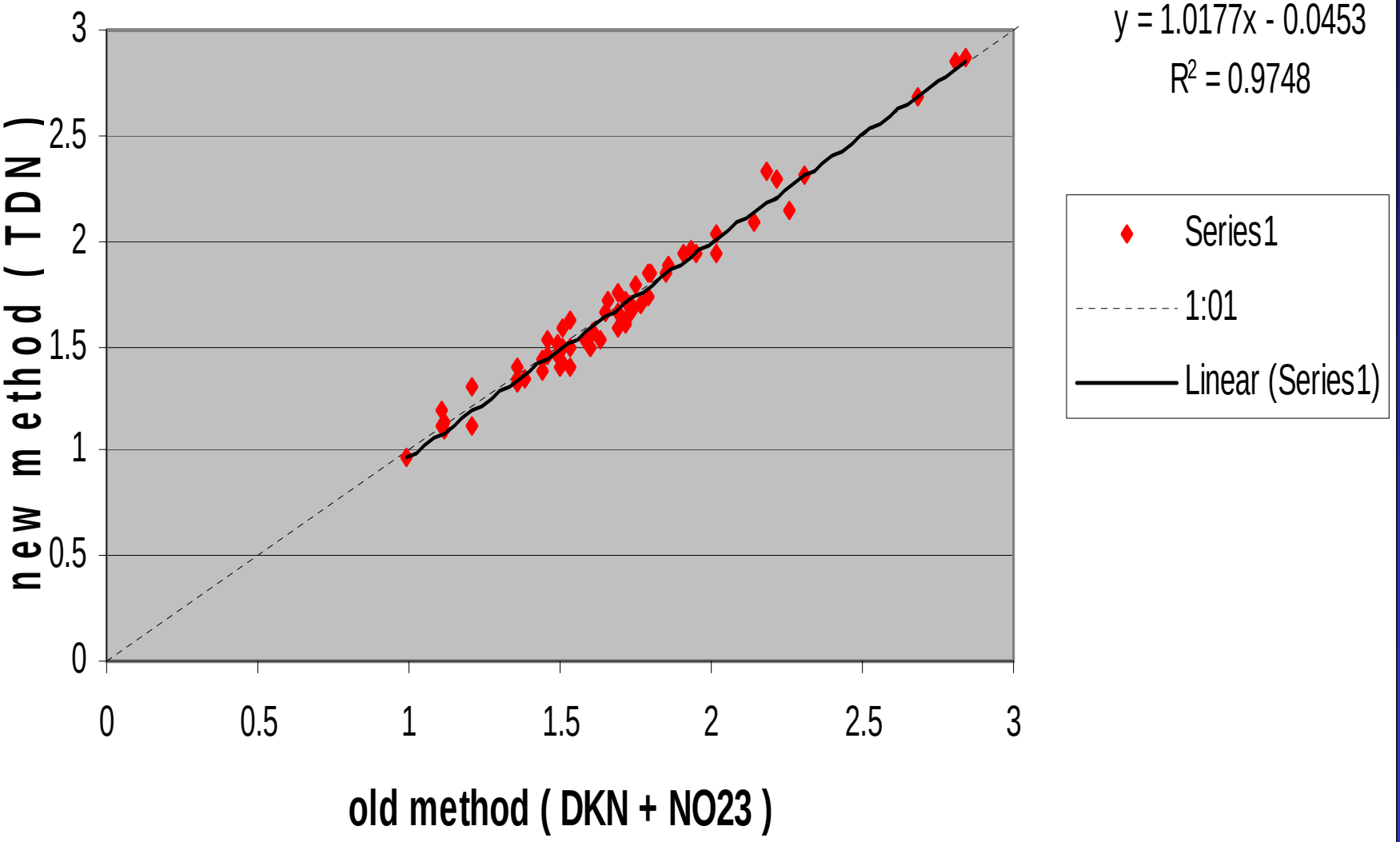
T O C


y = 0.8079x + 0.4406
R2 = 0.9631
new method (DOC + PC)
old method (TOC)
0
5
10
15
20
25
Series1
1:1
Linear (Series1)

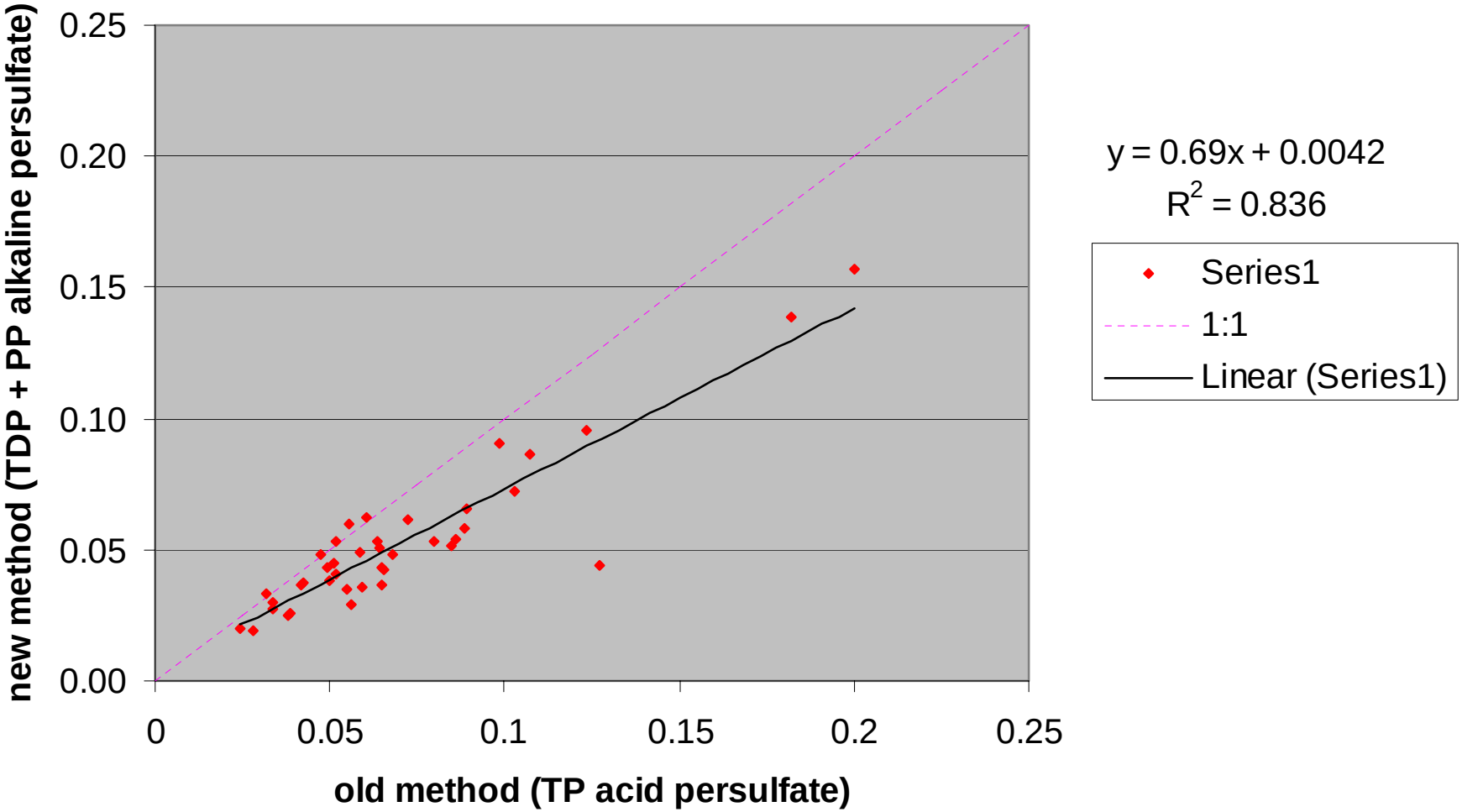
Total N


y = 1.0034x - 0.0471
R2 = 0.9
Series1
1:1
Linear (Series1)
new method (PN + TDN)
old method (TKN + NO23)
0
0.5
1
1.5
2
2.5
3

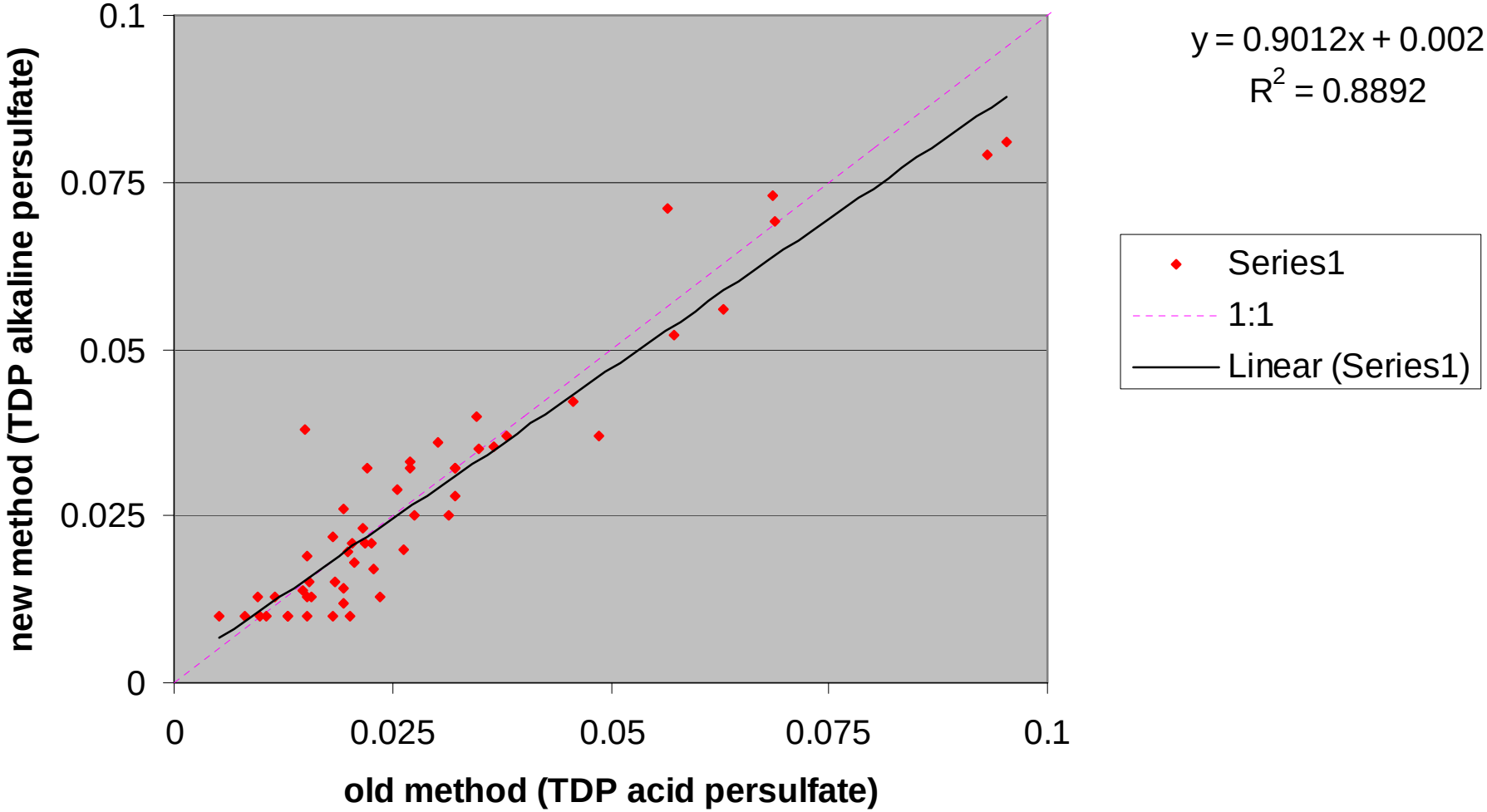
Dissolved N


y = 1.0177x - 0.0453
R2 = 0.9748
Series1
1:01
Linear (Series1)
new method (TDN)
old method (DKN + NO23)
0
0.5
1
1.5
2
2.5
3

Total P


new method (TDP + PP alkaline persulfate)
0.25
0.20
0.15
0.10
0.05
0.00
0
0.05
0.1
0.15
0.2
0.25
old method (TP acid persulfate)
y = 0.69x + 0.0042
R2 = 0.836
Series1
1:1
Linear (Series1)

Dissolved P


0.1
0.075
0.05
0.025
0
0
0.025
0.05
0.075
0.1
new method (TDP alkaline persulfate)
old method (TDP acid persulfate)
y = 0.9012x + 0.002
R2 = 0.8892
Series1
1:1
Linear (Series1)

Summary

Step 1. Check for bias between old & new methods before dropping old methods or making changes.

Step 2. Based on NEEDS versus COSTS we recommended to adapt new methods for N and C, but continue old method for P.

CONCLUSION- Adjusting to change is possible, but does take careful planning, time, and money.

http://va.water.usgs.gov/chesbay/RIMP/

- Program Information
- Data retrieval
- Trends
- Publications
- Bay links

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